DOCUMENT RESUME

ED 134 166 IM 004 326

AUTHOR Rampino, Tony; Schexnaydre, Linda
TITLE Operation and Maintenance of the 16mm Sound Film Projector.
INSTITUTION Texas State Library, Austin.
PUB DATE Mar 76
NOTE 39p.

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS *Audiovisual Aids; Equipment Maintenance; Film Libraries; Program Planning; Public Libraries; Screens (Displays); *Sixteen Millimeter Projectors

ABSTRACT

This manual presents information in seven sections: (1) parts of a 16mm film projector--film transport, threading, control, film projection, and sound system, and film projection correction devices, (2) threading procedures, (3) projection screens, (4) typical operating problems, (5) minor maintenance and repair techniques, (6) hints for the film showing, and (7) program planning. Diagrams of projector parts and projector-to-screen alignment are included. (SC)

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OPERATION AND MAINTENANCE

OF THE

16MM SOUND FILM PROJECTOR

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Prepared by: Tony Rampino
Linda Schexnaydre
Texas State Library
Austin, Texas
March, 1976

Edited by: Cyndy Halm
Texas State Library

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HOW IT ALL BEGAN

Artificially produced moving images have fascinated and challenged man for many hundreds of years. An early sign of this fascination is the ancient Chinese art of shadow plays in which the objects were placed between the light from fires, candles, or lamps to cast shadows on a wall or screen. Many people remember using their hands and fingers to cast shadowy figures on the walls of their rooms.

During the 19th century, the motion picture, as we know it today, was developed. In 1889, the T.A. Edison Labs had a working film camera called the Kinetograph. This invention was made possible by the introduction of flexible celluloid films produced by George Eastman. The width of the film was cut to thirty-five millimeters and perforated by Edision to fit his camera. The early showings were in the coin-operated peep-show machines called Kinetoscopes. In 1895, the Lumiere brothers, Joseph and Louis, demonstrated the first public projection of moving photographic images in the Grand Cafe in Paris. Almost simultaneously, other interested persons around the world were unveiling their creations so that by 1896, motion pciture photography was a recognizable and profitable business.

For the past forty years, public library staffs have found that the provision of 16mm film showings is a popular service to library users. In 1974, film showings in Texas reached over 1,731,881 viewers during 58,331 programs with an average of thirty viewers per showing. These figures will continue to increase dramatically with film services currently being provided through most of the public library regional systems. Early statistics for 1975 indicate an increase of three persons per showing over 1974 figures. According to a recent survey conducted by the Educational Products Information Exchange (EPIE), an educational research group, the 16mm film projector ranked fifth as one of the most owned pieces of audiovisual equipment in schools and libraries. However, it is ranked seventh as the most used piece of audiovisual equipment.

PARTS OF A 16MM SOUND FILM PROJECTOR

To be able to utilize a 16mm film projector effectively and confidently, a basic understanding of the operation and the different parts of the 16mm film projector is necessary. This section provides diagrams of the different components of the 16mm film projector with definitions and descriptions of each. Since many brands and models of 16mm film projectors are available, this section will describe the features each has in common and will indicate those that differ from model to model.

Information about the operation of the 16mm film projector and appropriate diagrams have been organized on the basis of six systems or functions within the projector:

1. Film transport system which moves the film
2. Threading systems
3. Control system which begins and ends all operation
4. Film projection system which creates the image
5. Film projection correction system
6. Sound system

Film Transport System

The film transport system is a synchronized method of moving the film past the light, the magnifier, and the sound producing elements in an orderly fashion to be retrieved efficiently and safely at the end of the journey.

Feed Reel contains the film to be fed through the projector.

Feed Arm is the part of the projector to which the reel is attached. The feed arm is usually located in a high position or a forward position. Most modern projectors have the feed arm attached permanently to the projector. However, many of the older models have feed arms that must be attached for operation and detached and stored when not in use.

Sprocket Wheels are wheels with raised regularly-spaced points designed to engage the sprocket holes on the left side of the film and guide the film along its path. There are only two sprocket wheels per projector: one located high and in front of the film channel; the other located low and at the end of the film channel.

Film Channel is the long grooved area behind the lens. It is never painted since the paint can rub off on the film or scratch the film. This area is always a base metal. The grooved area aids the film in moving past the aperture and the lens. Most projectors have a pressure plate with a spring attached to push the film to the left of the channel to keep the film aligned with the aperture.

Pressure Plate acts as a preventive agent to keep the film from buckling as the film passes the film advance arm. The pressure plate is attached to the lens housing. There are two adjusting screws and springs to adjust the pressure plate.

Film Advance Arm is located in a slot to the left of the aperture. The arm has three fingers at the end which come through the slot and fit the sprocket holes in the film to advance the film at the regular pre-set pace. (This is the area where the majority of the film damage occurs.)

Snubbers are wide smooth wheels that keep the film running smoothly. (They are the wheels that usually spin so easily when touched.) These wheels actually "snub" the moving film.

Framer is the device that moves the picture frame up or down so that the projected image sits squarely on the screen without a bottom or top line showing.

Take-up Reel gathers the film at the end of the cycle.

Take-up Arm is the part of the projector to which the take-up reel is attached. The take-up arm is usually located low or to the rear of the projector. The arm is permanently attached or detachable.

Threading System

The threading system is the most important segment of the transport process. The way the projector is threaded will affect the entire program. Since there is a right way and a wrong way to thread a projector, a thorough understanding of these procedures is important.

Reels are the carriers of the film software to be used with the projector. Following are the various sizes of reels, the showing time for each, and the method for determining showing times.

Film Reel Sizes 16mm	*Showing Time*
50 feet	*1 1/3 minutes*
100 feet	*2 3/4 minutes*
200 feet	*5 1/2 minutes*
300 feet	*8 1/4 minutes*
400 feet	*11 minutes*
600 feet	*16 1/2 minutes*
800 feet	*22 minutes*
1200 feet	*33 minutes*
1600 feet	*44 minutes*
2000 feet	*55 minutes*

The base reel for figuring showing time is 400 feet at eleven (11) minutes.

Sound film runs at twenty-four (24) frames per second or thirty-six (36) feet per minute. The sound track synchronization is twenty-six (26) frames ahead of the picture frame.

Silent film runs at sixteen (16) frames per second or twenty-four (24) feet per minute.
Raw movie film is shot at eighteen (18) frames per second.

Most reels are made of metal or plastic. Every projector should have a spare empty reel assigned as part of the projector's equipment. Every projector needs two reels for a showing: the feed reel which contains the film to be shown and the take-up reel, of equal size or larger than the feed reel.

Automatic Threading is the process of the projector feeding the film into the projector around the transport system automatically. The projector must be manufactured for this type of threading system and labeled accordingly.

Manual Threading is the process by which the operator must place and feed the film through the projector's film transport system by hand. This is the original and still the best method of threading a projector.

Semi-Automatic Threading is a combination of manual and automatic threading. The first part of the procedure is the automatic part, usually feeding the film past the lens and sound producing areas. The projectionist must then attach and carry the film to the take-up reel.

Manual Threading Advance Knob allows the projectionist to advance or reverse the film after it has been manually threaded. This procedure removes the slack from the film and insures that the upper and lower bows are correct.

Control System

The control system turns on the projector, the lamp, and the sound, and runs the film.

On-Off Switch simply turns the motor on or off.

Lamp Switch may be connected or separate from the on-off switch for the motor. This switch also turns on the fan and blower.

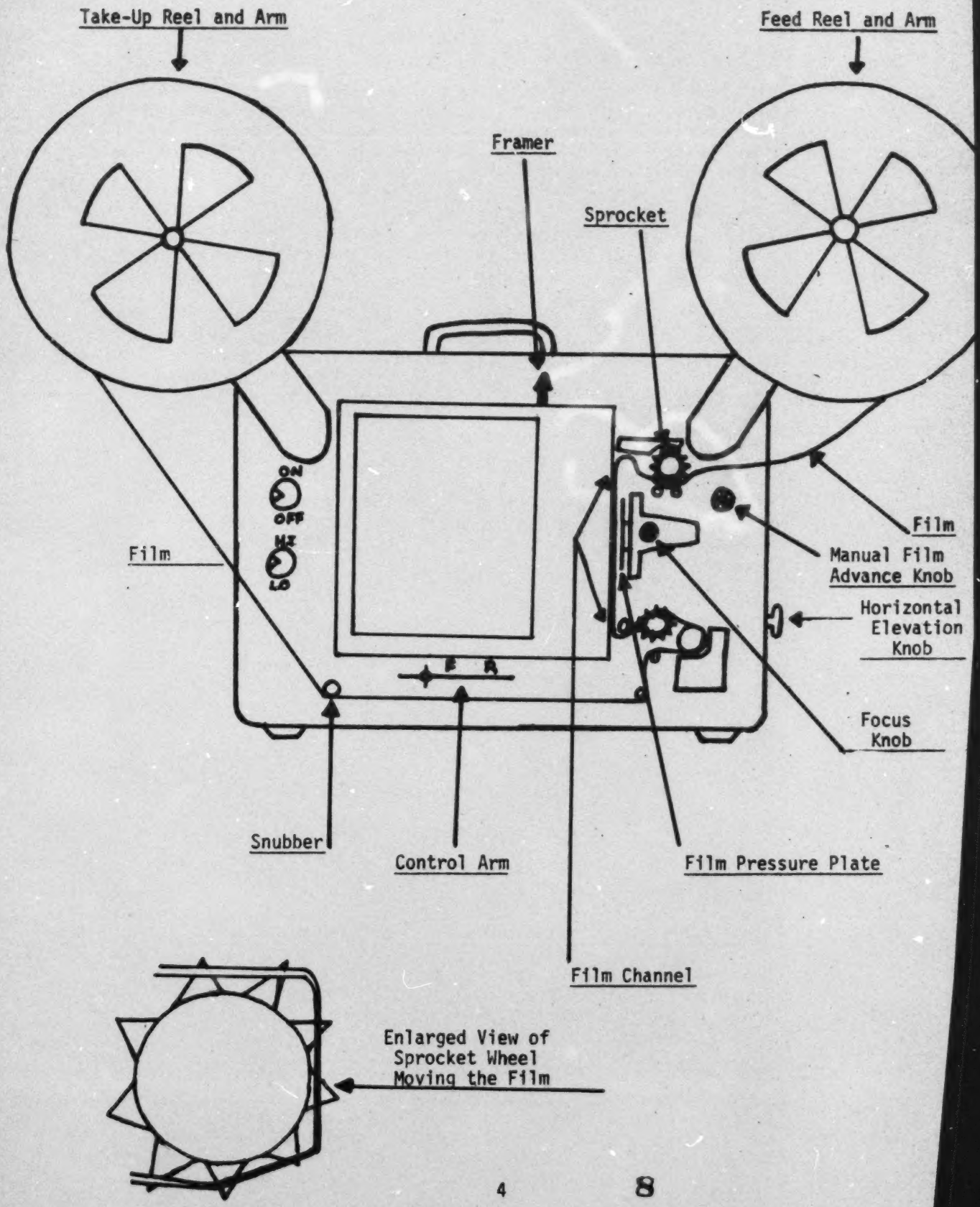
Volume Control turns on the sound and raises or lowers the sound.

Tone Control sets the bass and treble tones, making the voices sound deep or squeaky.

Still-Run-Reverse Control sets the gears and belts in motion to move the film forward or backward, or hold the film still. In the still position, the switch moves an asbestos glass in place between the lamp and the film. This asbestos shield is transparent and will allow enough light to project a dim image, but will prevent the full force of the light from burning a hole in the film.

Rewind Switch makes the film run backward at a faster speed than reverse. The reverse switch is normally used to run the film backward while it is still engaged in the film transport system. The rewind switch, on the other hand, is normally used when the film has passed through or has been removed from the film transport system and the film has to be transferred forward from the take-up to the feed reel.

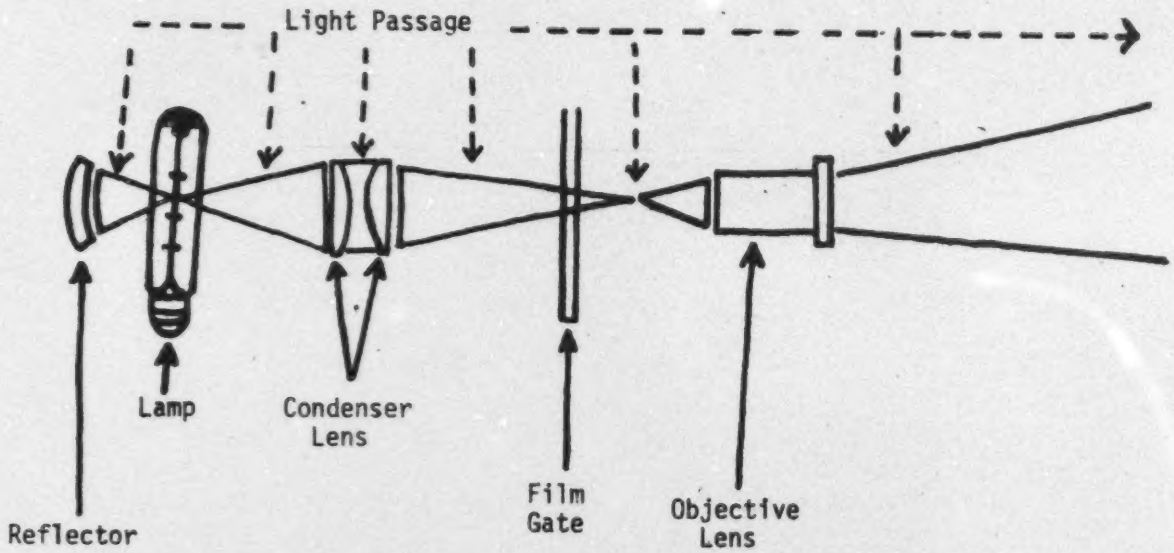
FILM TRANSPORT SYSTEM



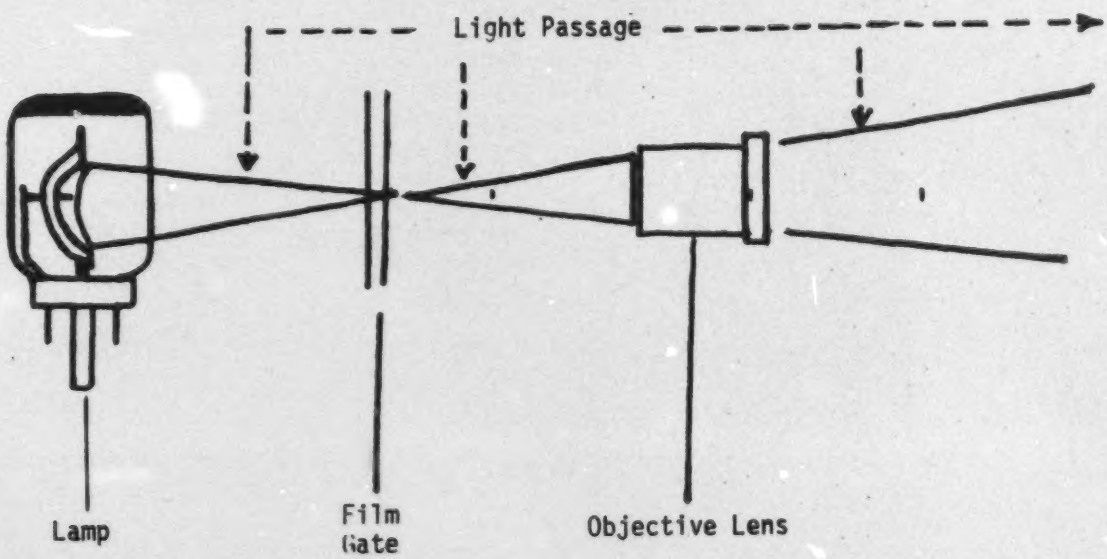
Film Projection System

The film projection system operates in a straight line, such as the light beam when it is cast through a dark night. The projector lamp generates the light as the gases burn and the filament glows. The painted top of the lamp and the reflector project the light beam forward to the condenser lens. The condenser lens then captures and limits the size and projects the power of the light through the aperture. The light passes through the film, the lens, and finally onto the screen. The darkness of the room and the power of the lamp combine with the illumination power of the screen to form the final image seen.

Older type projector lamp without built-in reflector:



Newer type projector lamp with built-in reflector:



Projection lamps vary in shape, base, filament, reflector, and materials. They are relatively expensive and last for an average of fifteen to twenty-five showing hours. The lamps are coded by the American National Standards Institute (referred to as ASI, ASA, or USASI) with the three-letter code referring to a specific lamp type. The most recent type of lamps is the tungsten halogen series. Parts of a lamp include:

Glass globe - the outer glass that encloses the projector lamp and filament. These materials are usually high heat silicones that can withstand a maximum temperature of 600 degrees Centigrade.

Base - the part of the lamp inserted into the lamp socket in the projector. Type of bases include pin, bayonet, screw, and ring types.

Filaments - the coiled and straight tungsten wires that radiate and ignite the gases within the glass globe.

Halogen gases - such as iodine, bromine, and chlorine are the latest and most improved gases to provide the projector lamp energy.

Reflector - the silvery plate or bowl that is either built into, around, or behind the center of the lamp. The most common lamps in use have the reflectors built into the glass globe. The reflector directs the light beam through the condenser lens, the aperture, the film, and the objective lens to the screen at a predetermined angle.

Condenser lens - placed in front of the projector lamp to reduce or enlarge the light beam. This lens normally consists of two contour glasses and one flat glass. The shape of the contour glass determines the height of the light beam passing through it.

Film gate - located behind the aperture within the lamp housing area. The film gate is a metal disc with a series of squares cut into the surface to coincide with the film frames in front of the aperture. The film gate moves in front of the aperture to allow or prevent the light beam passing through the aperture. (This process causes the flickering in the projected light beam.)

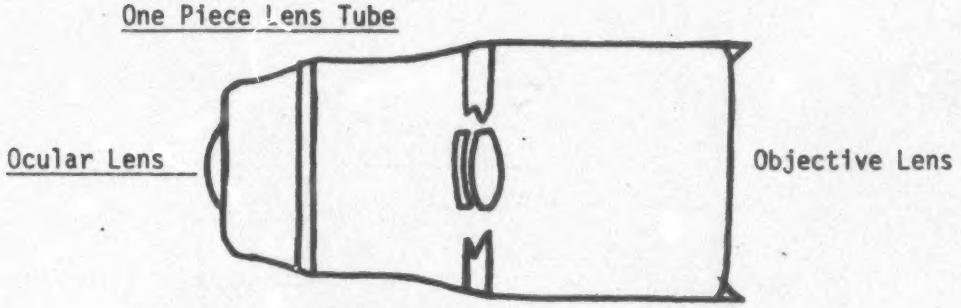
The objective lens is the optical device for forming an image of an object. In photography, the lens is always made of a transparent material, such as plastic or glass, and is always coated for color balance. The lenses are coated and shaped to accept different light rays and objects.

Lens housing - the part of the projector that holds the lens in place.

Lens focus knob - turns the lens body in a circular or straight movement back and forth to project a clear sharp image on the screen.

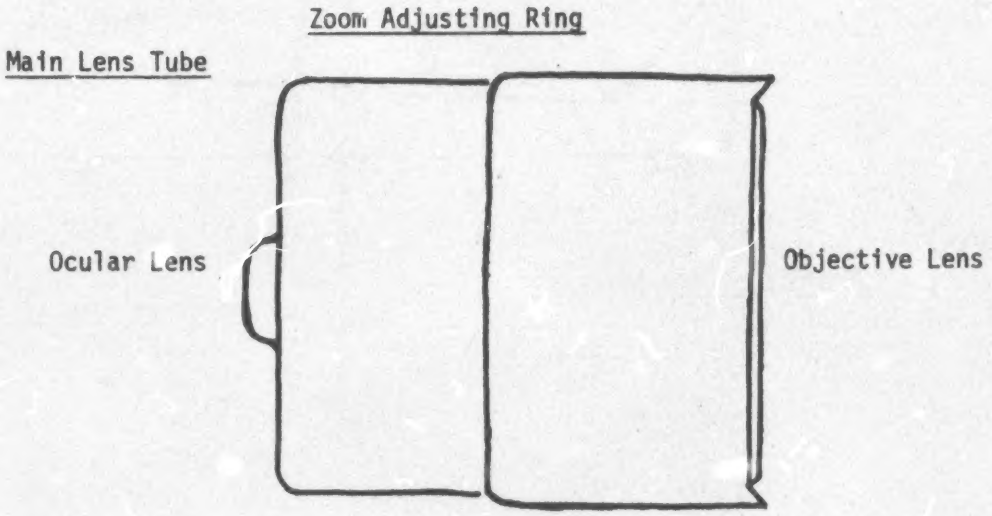
Standard lens - the type of lens with which the projector is normally equipped. (See diagram.)

Standard Projection Lens



Zoom lens - a lens that makes the projected image larger or smaller to fit the screen without having to move the projector back and forth.

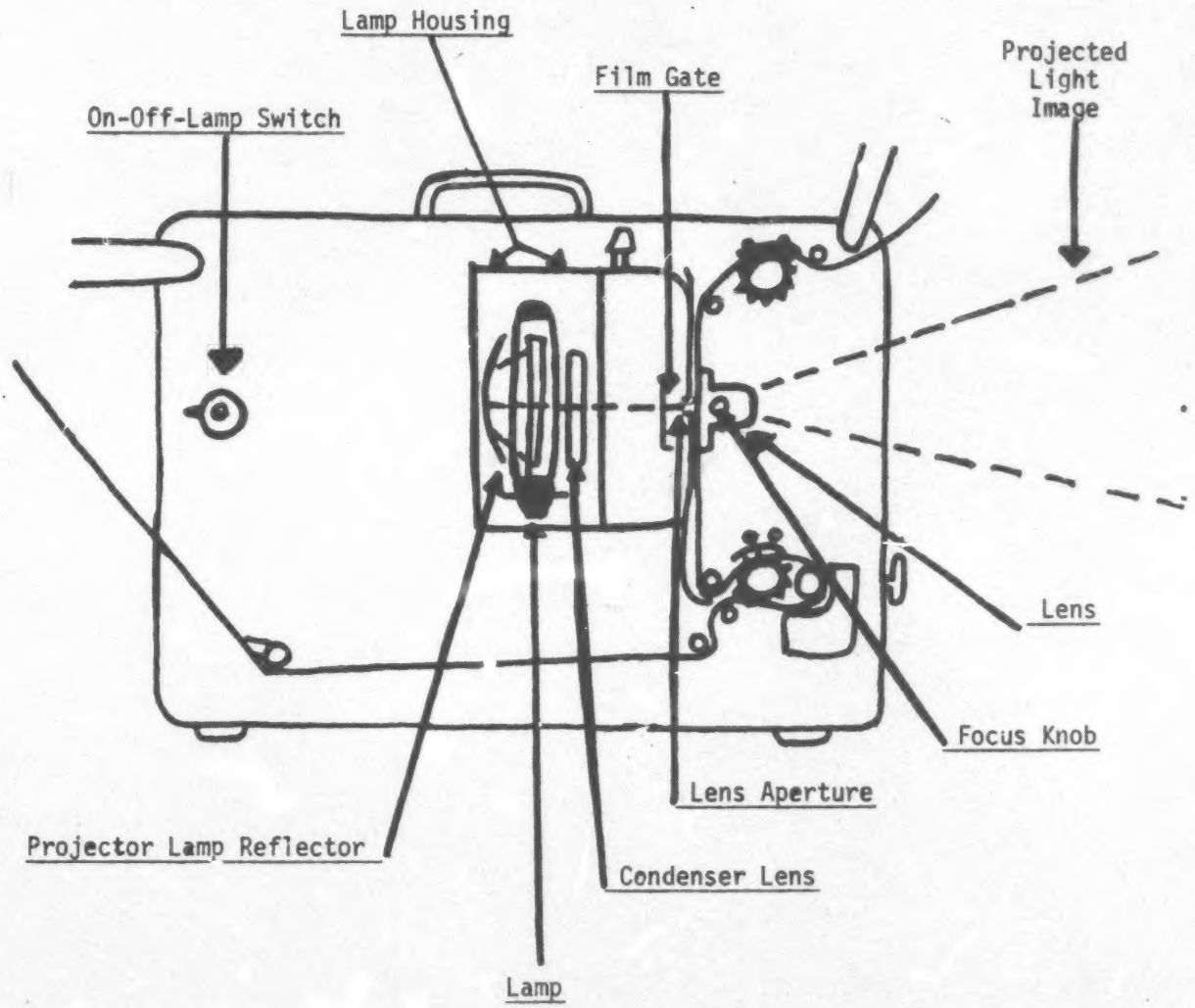
Zoom Projection Lens



Rear-screen projection lens - specially shaped to fill a screen at a close distance.

Elements of lens - the four to six pieces of glass placed in the lens tube to make the lens work properly.

Film Projection System



Film Projection Correction Devices

The film projection correction devices are the various devices built into projectors by the manufacturers. The devices have various names and locations and are not necessarily found on all projectors.

Horizontal knob, usually located on the front of the projector, controls the front leg that raises or lowers the projector to fit the projected image properly on the screen. It also allows projecting over the audience in a crowded room.

Framer allows for the proper framing or placing of the image on the screen. The film's individual pictures are called frames and are separated by borders or lines. When these lines show on the screen, the framer is used to raise or lower the image to correct the placement.

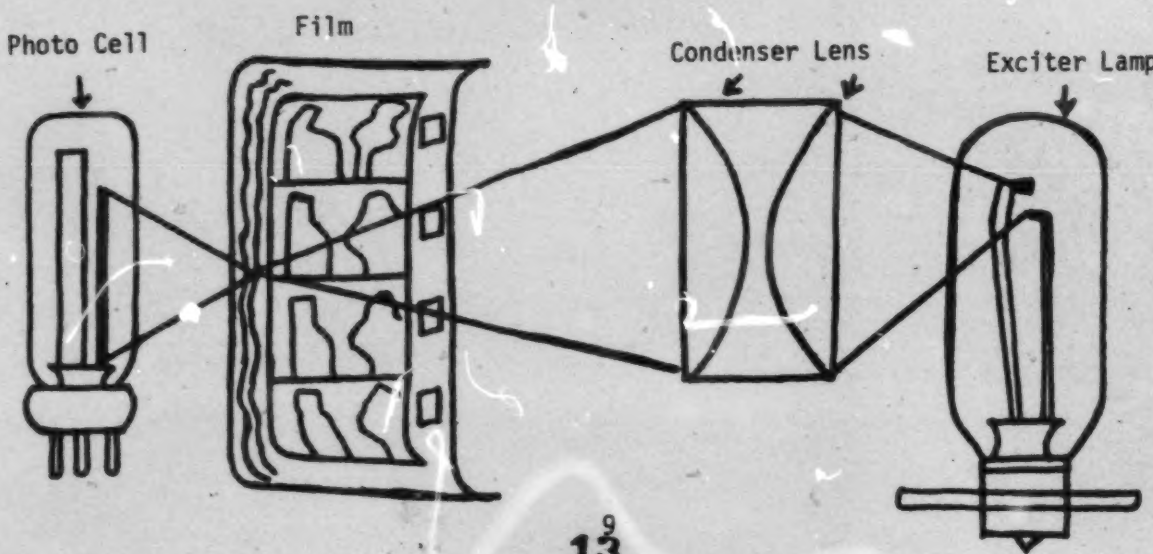
Systems restorer is a device that sometimes allows a fluttering, bouncing image to be corrected without turning off the projector.

Tilt knob raises the back of the projector on either the left or right side to correct the situation of an unbalanced table or slanting floor.

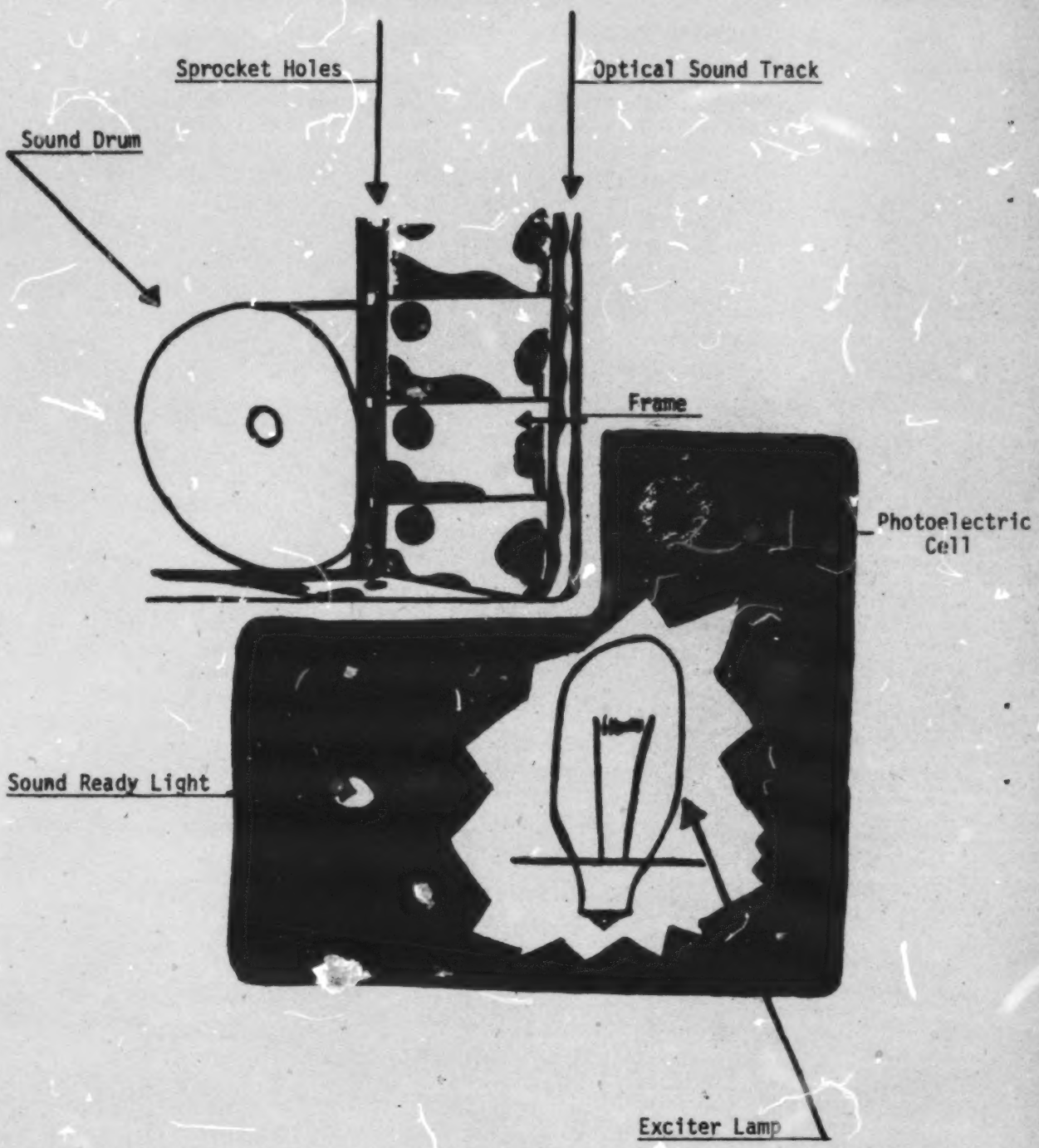
Sound System

Sound reproduction on optical sound projectors is produced by a light beam. An exciter lamp passes a light beam through the sound track on a film. The intensity of the light beam changes according to variations of density on the sound track. The varying light beam is detected by a photoelectric cell near the sound drum. The photoelectric cell, in turn, changes the light energy into electric energy which is amplified and used to activate the projector's speakers. (Simplified, the electrical energy equals sound waves.) The key to proper sound reproduction is in the bow and the smoothness of the film surface as it passes through the rollers and sound drum.

Optical Sound System



OPTICAL SOUND SYSTEM



The components of a sound system include the following:

Sound drum is the round hollow cylinder which absorbs the light from the photoelectric cell after it passes through the film sound track. The sound drum converts the electric impulse sound waves into words and passes these through metal contacts to the amplifier.

Snubbers keep the film smooth and straight as it moves past the sound.

Photoelectric cell directs the light as impulses from the exciter lamp into the sound drum. The light passes through the sound track's density.

Exciter lamp scans the sound track and excites the photoelectric cell. This lamp has a very low wattage, usually from .75 to 7.5 amperes. The light from the exciter lamp passes through the film's sound track and registers on a photoelectric cell. The cell converts the light into electrical impulses and the sound drum converts the impulses into the same audible, comprehensible words and sounds that were originally recorded.

Internal amplifiers are speakers built into the projector to amplify the sound.

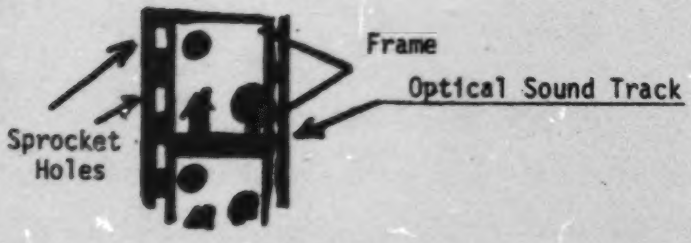
External amplifiers are speakers that must be plugged into the projector for amplified sound.

Amplifier tubes are similar to the old radio tubes which do burn out occasionally. However, the new solid state or printed circuit projectors do not have this problem.

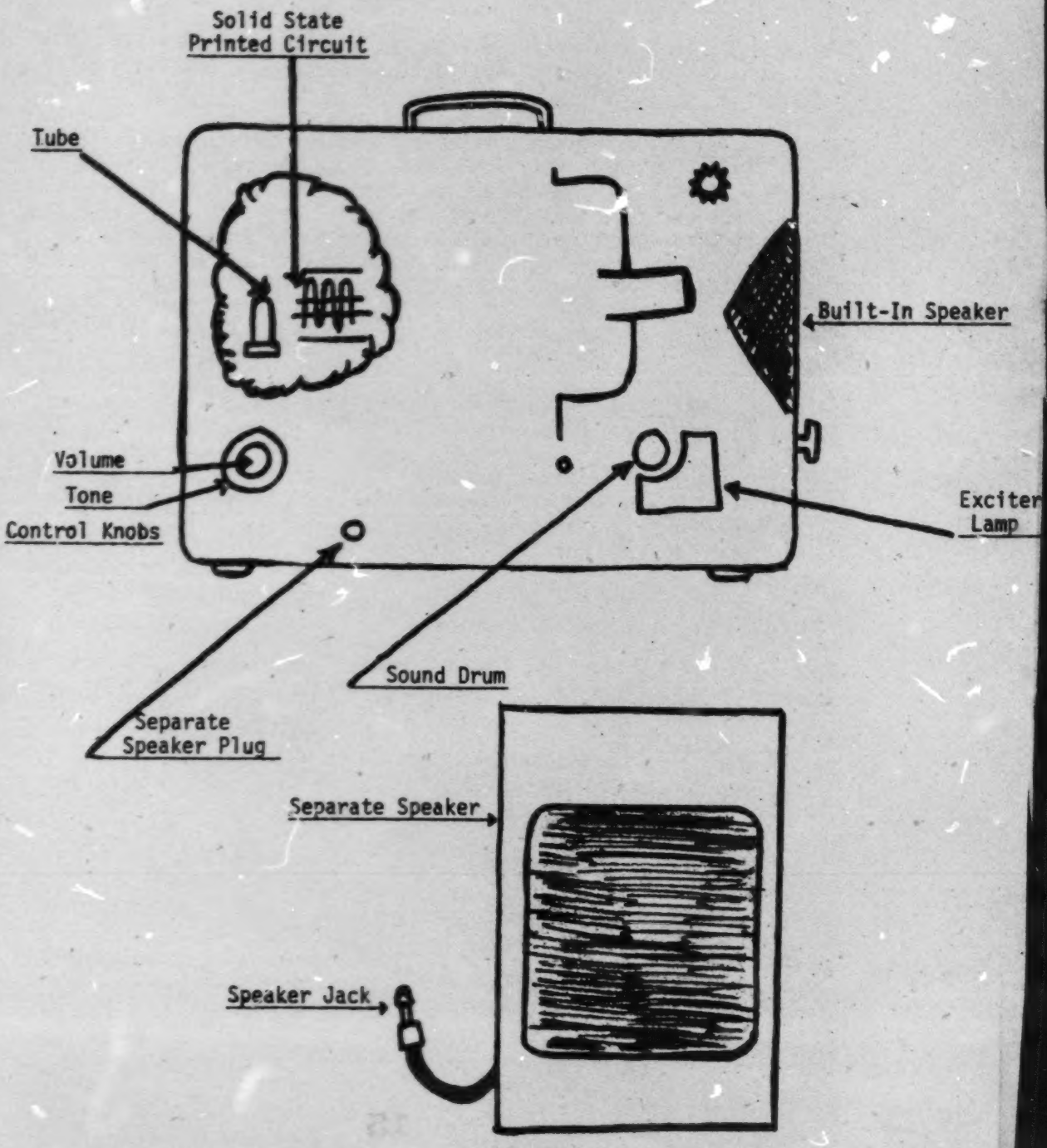
Solid state is a printed circuit board which has done away with most of the tubes and wires that used to run through the inside of the projector.

Speaker jacks are the same type of contacts used to plug in headsets and speakers to tape recorders and phonographs.

Silent-sound switch is used to change the speed of the film as it passes the projector's aperture. The silent film runs at sixteen (16) frames per second and the sound film moves at twenty-four (24) frames per second to synchronize the sound speed.



SOUND SYSTEM



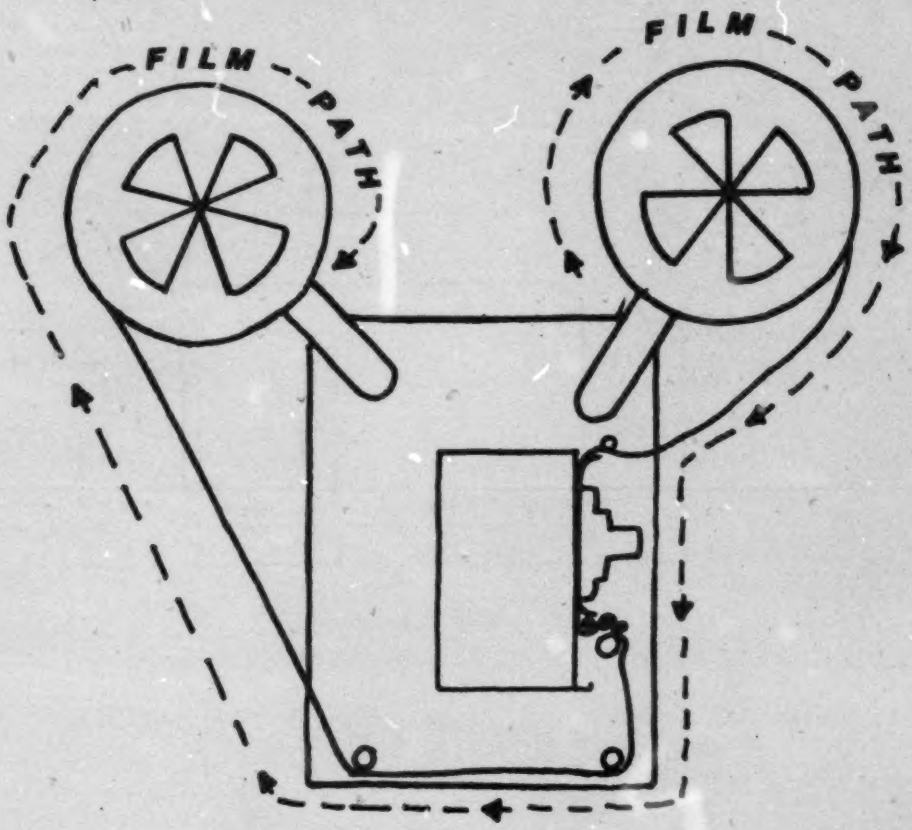
THREADING PROCEDURES

The threading procedure may be manual or automatic depending on the type of projector.

Threading a Manual Load Projector

The procedure commences and ends in the same manner for all manual load projectors. Although the position of the reels may vary, all other systems remain unchanged.

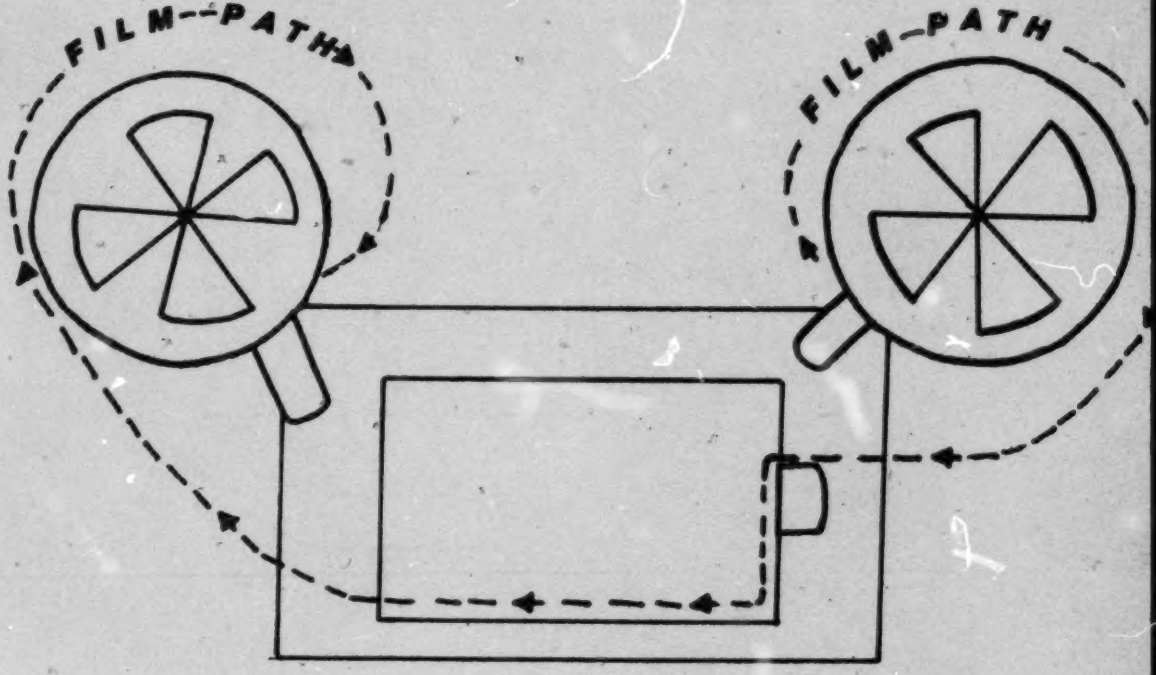
1. Hold the feed reel approximately five feet above the floor.
2. Allow this amount (five feet) of film leader to roll off the reel and touch the floor.
3. Attach the reel to the projector with the leader hanging loose.
4. Follow the loading and threading procedures for the projector in use.
5. Attach the leader to the take-up reel.
6. Rotate the take-up reel clockwise to take up the slack in the film.
7. Turn the manual film advance several times to adjust the film bows and to allow the film to seat itself properly.
8. Double check to insure all the gates are closed along the film's path.



Threading an Automatic Loading Projector

With an automatic loading projector, the film is inserted into the loading chute, passed through the projector, and attached to the take-up reel.

1. Attach the feed reel to the projector.
2. Allow approximately twelve inches to hang loose.
3. Set the automatic threading switch in position.
4. Turn on the projector.
5. Feed the film leader into the proper opening in the projector.
6. Wait until the film leader emerges from the back of the projector with enough film leader to reach the take-up reel.
7. Attach the film leader to the take-up reel.
8. Turn the take-up reel several times to remove the slack. On many projectors, this action will cause the automatic load to return to the normal running position.
9. Allow the projector to run a second or two to insure that the automatic loading device is turned off.



PROJECTION SCREENS

The important contribution of a screen to projection is its assistance in projecting the best image possible from the projector and film available. The projection screen can assist a dimming lamp to illuminate better for a longer period of time, sharpen a dull image, or heighten a dull color. Basically, two types of projection screens are available: the opaque type that reflects or absorbs the projected image, and the translucent type that allows the image to penetrate and show on both sides (such as the rear screen projection). Although a blank white wall can be used, the second layer of paint color may bleed through into the image. Listed are the different types of screens available for projection.

Matte is the blank white material screen cloth that resembles the bed sheet. It is the most economical, least distorting, and has little loss of illumination of the screen materials. It can be best used in wide rooms and long auditoriums.

Glass bead screens are the most troublesome of the group because the glass beads are encrusted into the surface of the canvas backing. Prolonged exposure to the air turns this type of material yellowish, cracks the adhesive base, or causes damaging mildew. The glass beads are cut like gems to reflect light. For this reason, they are not recommended for wide close rooms. The screen is better used in long narrow rooms in which the audience can sit about six feet from the front and about three seats to either side of the screen. (Persons seated in the straight center will have the best view.)

Silver lenticular screens are painted surfaces applied to the canvas backing. The paint is either aluminum or other silver metallic color. This type of screen causes a loss of brilliance with color film because the silver luster fades and eventually the paint cracks with use and age. However, since the silver lenticular screen is ridged, it provides the best viewing from all angles in the various types of viewing rooms, unlike the matte screen which is flat or the bead screen which is crusted.

There are several models of light and compact portable screens that can be carried from place to place for showings. The non-portable screens are the wall screens that can be pulled up and down (like a window shade) or are mounted permanently in place. Budgets and needs will guide the selection of a screen type.

The size of a screen is governed by the room size and the average size of the audience. Small rooms require small screens; larger rooms can accomodate larger screens.

Distances from projector to screen are dictated by what is available as a showing place. The image size on the screen can be adjusted by changing the projector-screen distance. When the projector is moved toward the screen, the image will become smaller and brighter. Moving the projector away from the screen produces a larger but less bright image.

The popular screen sizes for the portable screens are thirty-by-thirty inches, forty-by-forty inches, fifty-by-fifty inches, and sixty-by-sixty inches. (See the following chart for sizes and distances.)

SCREEN SIZE											LENS FOCAL LENGTH
30"	40"	50"	60"	70"	84"	96"	9'	10'	12'	14'	
DISTANCE FROM PROJECTOR TO SCREEN											
7'	9'	11'	13'	15'	13'	21'	24'	26'	32'	37'	1"
8'	12'	16'	19'	22'	26'	30'	35'	38'	47'	54'	1½"
14'	18'	22'	27'	31'	38'	43'	48'	55'	65'	74'	2"
16'	22'	28'	33'	39'	47'	53'	60'	67'	80'	93'	2½"
20'	26'	32'	39'	45'	55'	62'	70'	78'	94'	109'	3"

TYPICAL PROBLEMS IN OPERATING A 16MM PROJECTOR

(What To Do When Things Go Wrong)

Listed below are some of the most common problems the projectionist will encounter in operating the 16mm film projector, and possible solutions to these problems. The best way to prevent many potential problems is to plan routine maintenance procedures including a double-check of the condition of both projector and film before a showing.

Projector

Problem: Dead projector.

Solution: Do not waste time checking the projector for causes of the problem if another projector can be found immediately. If another projector is not available, then begin checking the malfunctioning projector for the cause by checking the plugs and switches. If after a reasonable length of time the problem is not corrected, cancel the planned program.

Problem: Overheated projector.

Solution: Check the fan and belts; replace belts which are worn or broken.

Electrical

Problem: Electrical outlets that have only two holes for a three-prong plug.

Solution: Acquire an adapter with two prongs and three holes. Plug this into the electrical outlet and fasten the ground wire to the screw in the cover plate.

Problem: The nearest electrical outlet is ten feet beyond the projector cord.

Solution: Obtain a heavy duty extension cord. A regular cord will accomodate temporarily, but a heavy-duty cord is recommended for permanent use.

Reels

Problem: Improper size take-up reel.

Solution: Use the take-up reel on hand and allow the excess film to fall to the floor or into a large container. Guide the excess film into a loose pile, but do not grasp or touch the film with fingers. (There is less moisture on the back than on the palm of the hand.)

Problem: No spare reel.

Solution: Allow the film to fall to the floor gently or into a large container. Do not touch it or handle it. When the showing is finished, attach the tail or the film to the feed reel; shift the projector to reverse and slowly and carefully rewind the film back onto the feed reel. Do not allow the film to knot or bind. If knotting does occur, stop the projector and unravel the snarl by hand.

Problem: Jammed reel cans.

Solution: A screw driver, strong fingers, or any thin-edged object can be used to pry open the cans (similar to opening the old shoe polish can with a coin).

Problem: Film reels will not turn.

Solution: Check and replace broken or worn belts.

Problem: Bent reels.

Solution: Straighten out as well as possible (i.e., on the edge of a table). Insert the reel around the table's edges to straighten the reel. Later, cut an appropriate piece of wood and insert this into the reel, leaving the reel thus while not in use.

Film

Problem: Broken or damaged film.

Solution: Allow the damaged area to clear the moving parts of the projector so the damaged area is accessible. Turn off the projector. Use masking tape which is easy to spot, does not stick too well, and is easy to remove, to tape the two broken ends together. Turn the take-up reel to remove slack. Check the film and set it properly in place. Start the projector and resume the show.

Problem: Damaged film causes the projector's hum to become erratic and causes the film to flicker.

Solution: Stop the projector and check the film's seating along the film transport system. If everything appears in order, start the projector. (The manual film advance can be helpful in solving this problem.)

Problem: No film.

Solution: Use good judgement. Cancel the program or locate a suitable substitute. (Use hidden talent.)

Problem: The wrong film.

Solution: Use the film if possible; the wrong film may even be a winner.

Problem: Discolored film.

Solution: Caused by improper storage where heat or cold has affected the dye and binder. Use until it can be replaced. (Store film at temperatures near 72 degrees Farenheit to prevent further problems.)

Problem: Scratched film.

Solution: Clean the film transport system with a drop of alcohol to remove dirt. Apply a very light coat of light machine oil to the parts.

Threading

Problem: Incorrectly wound film.

Solution: The only solution is to stop the projector and rewind the film correctly.

Problem: The automatic threading projector refuses to advance the film leader tape.

Solution: Each projector usually has built in along its base a small cutting device. Insert the tip of the leader about an inch to cut it off to correct the problem. If no cutter is built in, use sharp scissors or knife to cut the leader cleanly. Do the same to crinkled leader tape. The leader must be smooth and flat to pass through the projector transport.

Problem: Film running at a rapid blur through the automatic threading projector.

Solution: Depress the systems restorer, or stop the projector and disengage the automatic threading device.

Problem: A flickering picture on the screen causing a clatter in the machine.

Solution: The automatic threading device has a systems restorer that must be depressed and held for a short span (fifteen to thirty seconds) then released. The manual thread projector must be turned off and the upper and lower film bows restored.

Screen

Problem: Wrinkled screen.

Solution: If a screen is new or has not been used for awhile, fully extend it for a period of twenty-four to forty-eight hours to smooth the creases.

Problem: Soiled screen.

Solution: Clean the projector screen with a mild detergent, warm water, and a soft cloth. Do not rub the material. Gently wipe the screen and rinse with clear water.

Image

Problem: The picture is out of focus.

Solution: Turn the focus knob or lens to sharpen the image. Check the lens housing to properly seat the lens. Check the pressure plates behind the lens housing for proper pressure.

Problem: Dust specks on the projected image.

Solution: As soon as the program is over, brush and blow the area around the aperture and lens.

Sound

Problem: No sound.

Solution: First check the exciter lamp. If it is loose, tighten it; if it is burned out, replace it. If the sound switch is on "silent," move it to "sound." Be sure the volume control is turned on loud enough to be heard. Pull out the external speaker jack and plug it back in slowly until contact is made. Check the projector cords to insure they are properly seated in the sockets.

Problem: Scratchy sound track.

Solution: Change the exciter lamp, or check the amplifier tubes and wires.

Problem: Unsynchronized sound.

Solution: Check the upper and lower film bows.

Projector Lamp

Problem: Manufacturer's defects. These types of malfunctions will be apparent at the very beginning and include the following:

The lamp goes off suddenly after being placed into the projector. A yellowish coating around the inside of the clear lamp glass indicates an air leak allowing the gas to escape and be replaced by oxygen.

The new lamp does not light up. Particles of the coiling inside the lamp globe or reflector move around the inside of the sealed globe and are visible when the lamp is turned upside down.

The lamp goes out soon after being placed into the projector. The metal base is loose. The crystal and base should fit tightly in the same way a light bulb and base do.

A new lamp does not fit into the holes in the projector base. The pins, fins, or threads are incorrectly set. Attempt to gently straighten these brass contacts with pliers and reinsert the lamp.

Solution: Return the defective lamp in its original carton to the manufacturer with a note asking for replacement. The manufacturer's defects are just that - defects in the lamp caused during manufacturing. All manufacturers' lamps are guaranteed to be free of such defects. Do not discard these lamps since the average cost per lamp is about $8.25.

Problem: No light.

Solution: Check the lamp, the switches, and cords. If none of these is the cause of the problem, cancel the planned program.

Problem: Lamp failure - high voltage or power surge.

Solution: Lamp failure due to high voltage occurs only rarely when a lamp receives more electric power than it is manufactured to receive. There is no control over this type of failure. Simply replace the defective lamp. However, if this type of failure occurs too often, a qualified person should check the outlet.

Problem: Lamp failure - hand moisture or oily substances.

Solution: A projector lamp reaches a very high degree of heat output when in use (approximately 600 degrees Centigrade). At this high temperature, most foreign substances on the lamp's surface will be cooked and cause the glass to bubble or break. Skin moisture is a major cause of this type of failure. Do not touch a lamp with a bare hand. Instead, use a cloth to handle the lamp or to wipe the lamp glass clean if it has been touched.

Problem: Lamp failure - improper installation

Solution: Install the lamp properly since a bent base can short out the lamp quickly.

Problem: Lamp failure - worn or damaged wiring

Solution: If too many projector lamps burn out at an unusually rapid rate, check the lamp socket and wiring for worn or overheated wires.

Problem: Lamp failure - defective switch

Solution: If a lamp proves to be usable and the other causes for lamp malfunction are not apparent, check the lamp switch which may be worn from constant usage. Replace the switch immediately.

Problem: Incorrect replacement.

Solution: If the projector lamp that has been recommended by the projector manufacturer is not available, then use only the lamp substitute recommended by the lamp manufacturer's guide as a replacement. Do not accept any substitute other than the one recommended.

Problem: Overheating

Solution: Whenever possible, pre-heat the projector by turning on the motor only, such as when threading the film to prevent a hot electrical charge suddenly contacting the cold projector lamp. Also, when not actually showing a film, such as changing reels, allow the motor to run without the lamp being on, allowing the projector to cool itself faster and more efficiently. Turn off the projector and allow the lamp to cool. Open the lamp housing door to help it cool faster. Use a cloth both to remove the warm lamp and to insert the new lamp. The cloth prevents a burn if the old lamp is still hot and also prevents fingerprints on the new lamp. Periodically check the fan and belt that are nearest to the projector lamp visually. Check the vents and opening in the vicinity of the lamp housing for a build-up of dust and dirt removeable with a paint brush or cloth. (An overheated lamp can also cause rubber and plastic parts to melt.)

MINOR MAINTENANCE AND REPAIR TECHNIQUES

Maintenance of equipment is an important part of an on-going media program. A service contract for preventive maintenance, scheduled for at least every six months, should be made with the nearest authorized service dealer. Although the cost of a service contract will vary, the expense is small compared to lost time. Unless the media librarian is thoroughly familiar with repair work on audiovisual equipment, he should not attempt to make major adjustments in the components or to disassemble them. Leave such work to experts.

However, the media librarian and staff can perform minor on-site maintenance. Although on-site maintenance will not prevent wearing parts or burned out lamps, it will extend the life of the equipment. Such on-site maintenance should be performed each time the projector is used and includes dusting the projector parts, cleaning the lens, removing emulsion build-up, and applying oil.

Maintenance on the Projector

When setting up the projector for a showing, always have the maintenance kit on hand. Develop the habit of performing the maintenance steps automatically.

1. Open the projector lid.
2. Dust the inside of the cover with a cloth.
3. Dust and brush the film transport system with the cotton cloth and paint brush.
4. Open the lens housing and dust the area with a brush and blow away dust particles.
5. Check for emulsion build-up on the aperture and pressure plate; clean with the emory board and rubbing alcohol, and very lightly oil.
6. Close the lens housing and check the lamp for proper functioning. Check the lens for fingerprints or dust; clean it with a soft cloth and the optical glass cleaning liquid.
7. Tighten the screws around the projector case only "finger tip" tight.
8. Check the wires for signs of wear.
9. Check the ground plugs.
10. Check the spare take-up reel for bent areas. Insert the wood block to straighten any dents. Always handle the take-up reel by the center holes, never by the flexible ends that might bend.

Items Needed for Minor Maintenance

For the projector:

Sewing machine oil is a very lightweight oil that should be used sparingly to lubricate the visible wheels on the projector.

Cotton cloth which should be lint-free and soft to prevent lint particles on the projector parts is used to wipe all parts before each showing.

Paint brush (one-inch) is a good device for dusting other areas the cotton cloth will not reach.

Phillips screw driver which will fit only a screw head with the cross mark is used periodically to tighten screws that are visible.

Regular screw driver will fit only the single notched screw heads and is used periodically to tighten screws that are visible. Tighten screws only "fingertip" tight; do not strip screw heads.

Emory boards are convenient for cleaning dirt and film emulsion build-ups that harden in places such as the film channel and aperture areas. When black streaks or black spots appear on the shiny metal of the film channel or aperture area, use the emory board lightly.

Liquid glass cleaner is best for cleaning the coated lens without leaving a chemical or harmful residue on the lens. Use a suitable cleaner manufactured for cleaning eye glasses or coated optics. Check for dust or fingerprints on the lens before each showing or after the glass surfaces are touched.

Rubbing alcohol used sparingly is best for breaking down grease and chemical build-up on external projector parts. Do not use the alcohol on soft rubber parts which will break down.

For the film:

Masking tape is used to temporarily bind or patch film together until a permanent repair can be made.

Butt splicer is a small device used to hold a film together while it is being repaired.

Splicing tape is a transparent celluloid tape with sprocket holes that correspond to the film's holes. Splicing tape is recommended because it does not affect the film thickness as does glue. (A glue splice requires the film ends to be laid on top of each other, thus doubling the thickness of the film and causing the projector to flutter. Glue is affected by changes in climate and temperature as well.) The tape will withstand greater tension than does glue.

Leaders are normally colored plastic strips shaped similarly to film. Most damage and wear occurs to the beginning and the end of a film due to the loading and unloading. The ends of the film may also bend during threading on the reels. Many automatic threading projectors require that the first section of film be cut a certain way. (Imagine cutting away good film each time!) The film should be marked with the owner's name and leader film is excellent for this purpose. A tail and leader should be three to four feet in length.

Cut wood blocks inserted into empty reels help the reels to maintain shape and spacing when stored.

AUDITORIUM HINTS

Setting Up for the Film Showing

This section deals with the comfort of the audience which can affect the general attitude toward the program. Pay attention to these details. Many are generally overlooked in the activity of getting the program started.

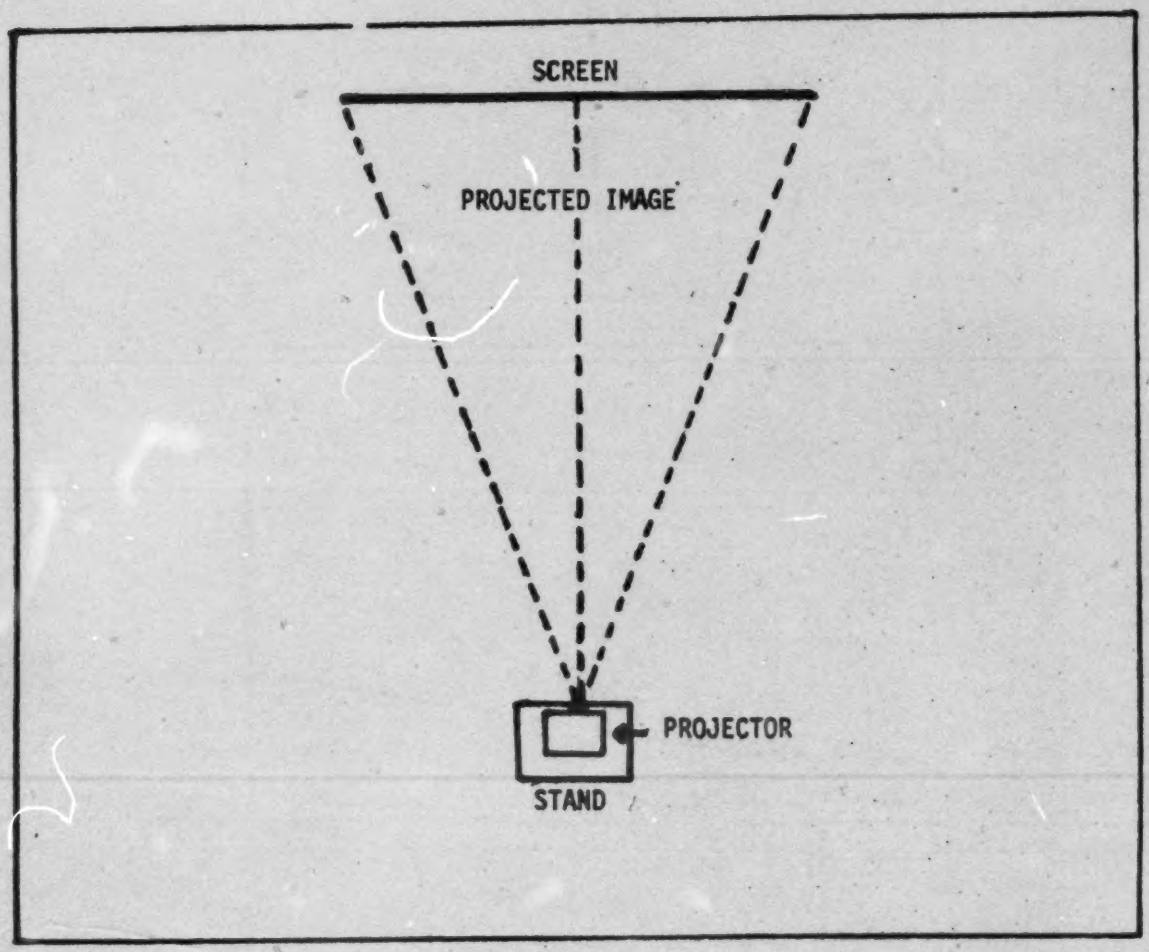
Blackout conditions do not necessarily require a totally dark showing room. Some light is acceptable as long as it does not annoy or distract the audience. The best method of darkening a room for showing is paneled drapes or painted glass window panes. Window shades of a dark color also work well. If a window or light cannot be blocked, the screen placed in front of the light, will prevent the light interferring with the image on the screen. The audience's attention will be centered on the screen, not on the back-light. Keep the doors to lighted areas closed during a showing since the worst kind of distraction is a stabbing light across the path of vision. Whenever possible, before and after a show, allow the lights to come back on softly. A blinding light is harsh and could cause someone to stumble.

Audience seating is based on a practical approach. Where seating is directed, attempt to work from the center to the outsides. Children feel comfortable on the floor on cushions. Handicapped persons should be seated close to the aisle near the exit. (See Safety Tips for further guides.)

Positioning the projector should be accomplished prior to the program. Ideally the projector should be near the rear of the room, opposite the screen and on a high platform to clear the seated audience. Locate the electric outlet, exits, and light switches before the participants arrive.

Correct projector-to-screen alignment is accomplished when the projector is positioned so the lens faces the center point of the screen area. A minor raising of the projector will not visibly affect the projected image. After making a visual alignment, turn on the projector to align the projected light beam onto the screen and to determine an accurate image size on the screen. Do not prop a projector on books or other flimsy material. Doing so may cause the projector to topple with only a slight jarring.

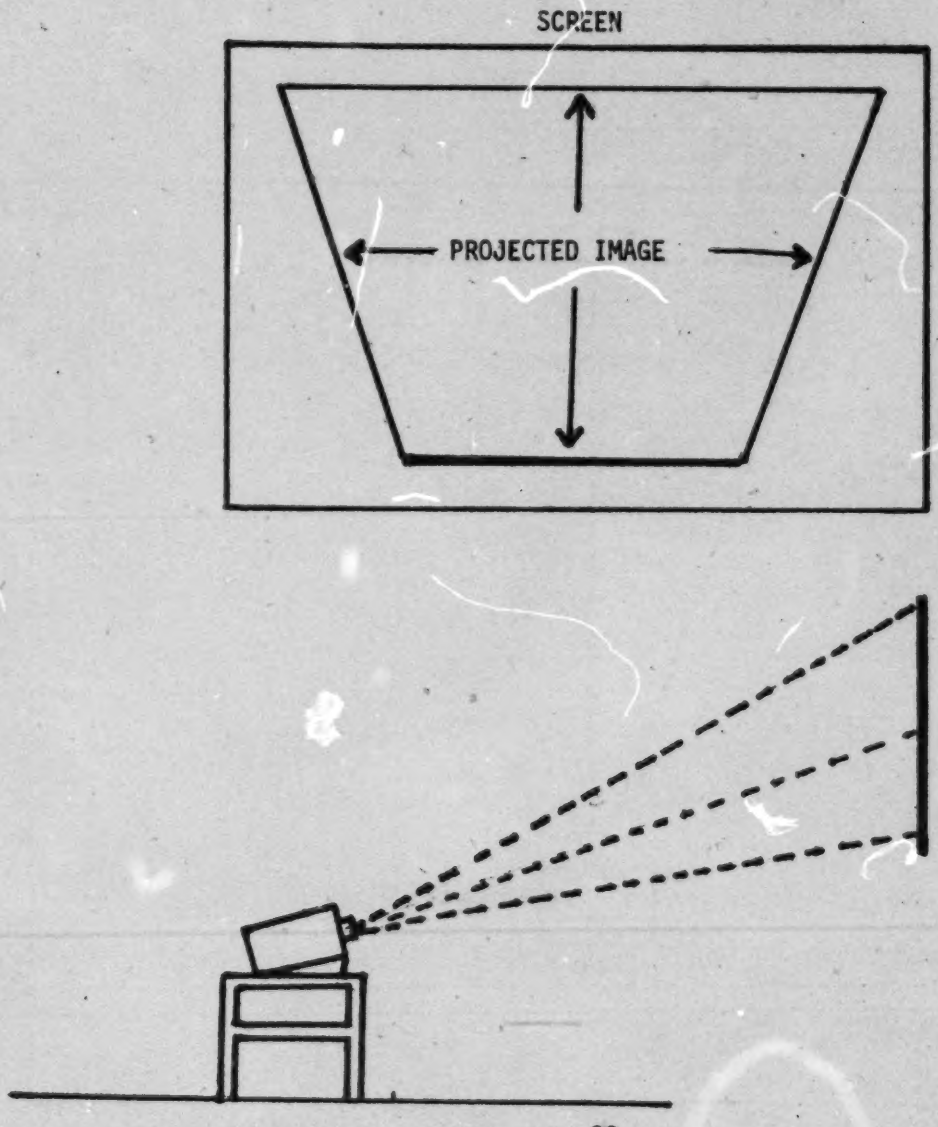
Correct Projector-to-Screen Alignment



SHOWING ROOM

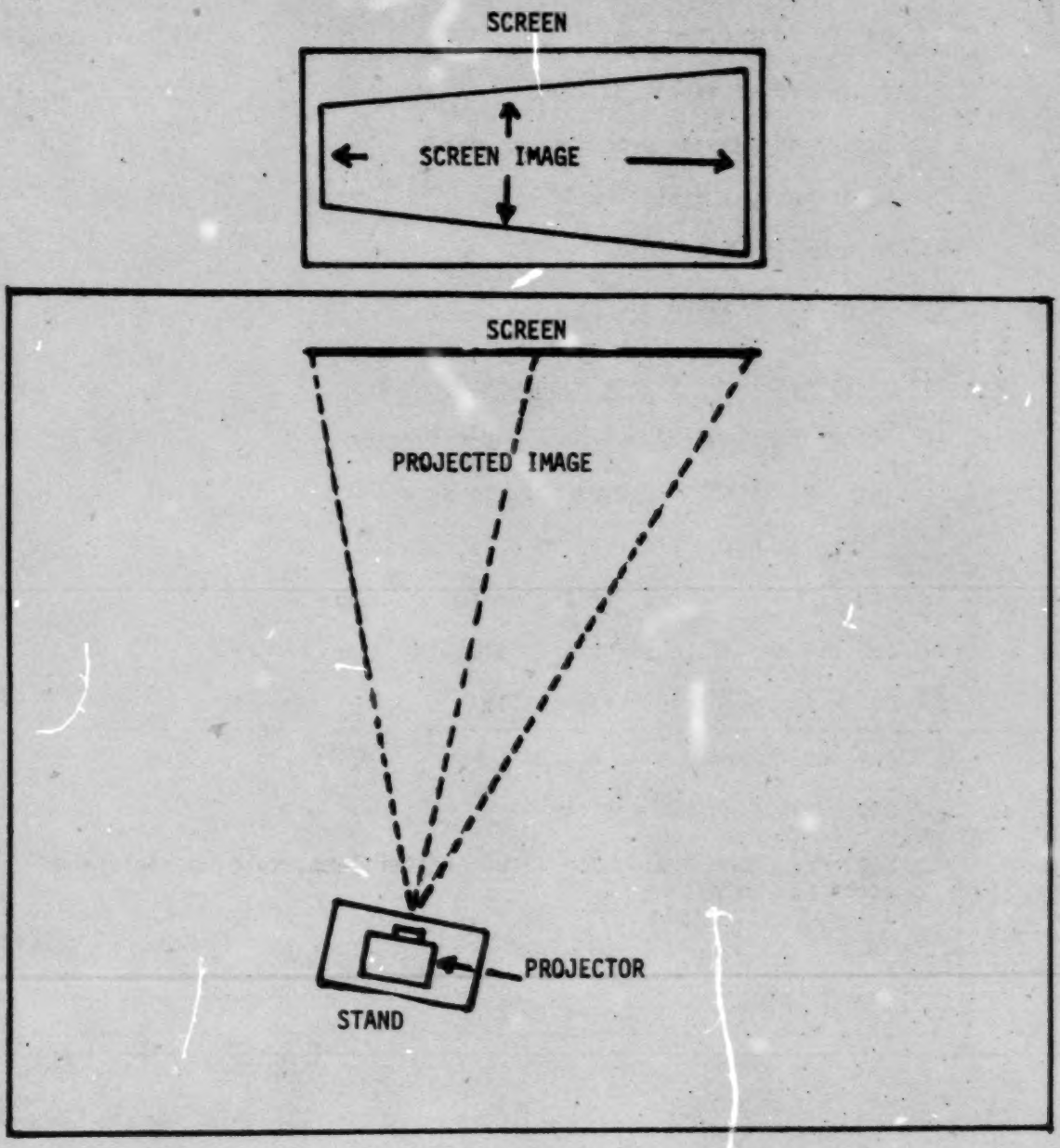
The most common error in aligning the projector to the screen is lowering the horizontal foot to raise the projector. The result is a projection slanted high with the top border wide and narrowing inward to the lower border of the picture. (See diagram below.) This is the true "keystone" effect. When the projector is low and the screen high, the solution is to equalize the heights of the two by raising the projector or stand or by lowering the screen. In "tight" situations, raise the projector using solid cartons, wide strong boards, or large stools.

Incorrect Projector Alignment



Placing the projector to either side of room center and directly facing the screen results in a side-to-side "keystone" effect, as illustrated below.

Incorrect Projector Alignment



Checklist of Items Needed for Film Showing

1. Film projector
2. Projector stand, table, and area to place projector
3. One large take-up reel for projector
4. One spare projector lamp
5. One spare exciter lamp
6. One approved extension cord
7. Two-prong adaptor with ground wire
8. Screen or white blank wall
9. Maintenance kit
10. Films to be shown

Checklist of Things To Do Before a Showing

1. Set up the seating, screen, and projector
2. Set the distance of projector to screen
3. Place the external speakers
4. Check the equipment for proper functioning
5. Be sure to have the correct film
6. Check the condition of the film
7. Pre-set the focus and volume
8. Check the blackout effect
9. Secure a spare projection lamp, exciter lamp, take-up reel, and extension cord

Safety Tips

1. The audience should not be crowded into small areas. If a program is popular, schedule another showing as soon as possible. (The local fire department has occupancy laws regulating the number of persons in public areas.)

2. Do not allow audience members to block exits. Ask them to stand or sit in other spaces.

3. Handicapped persons should be seated near exits and close to aisles for easier mobility.

4. Check the electrical outlets before using them. Many older buildings may not have proper wiring to carry the electrical load. The city electrician will be glad to give his assistance.

5. Use electric cords with ground plugs.

6. Do not use an adaptor plug without using the ground wire. The ground wire can be connected to the screw in the outlet cover plate.

7. Use the heavy duty extension cords that are colored. They can be seen in a darkened room, are properly insulated, and have the ground plug outlet.

8. Do not wear dangling jewelry, scarfs or ties that may become tangled in the projector's moving parts.

9. Do not allow anyone other than the projectionist to touch the operating projector.

10. Secure the projector cord around the legs of the projector stand.

11. Place extra cords away from the traffic flow.

12. Do not touch hot projector parts or lamps.

13. Do not touch moving reels; allow them to stop automatically. (Rough edges can cut.)

14. Do not open a projector lamp housing while the projector is in operation; the lamp may shatter and broken glass may fly.

15. Do not leave a running projector unattended.

16. Remain calm in times of problems. Proceed with corrective measures.

17. Do not allow children to play on folding chairs which may fold and injure them.

18. Do not place projectors on shaky or wobbly stands.

19. Do not operate electric equipment while in contact with moisture (i.e., wet floor, cold drinks, etc.).

20. Do not operate equipment or conduct a program while under the influence of strong medication.

21. The film showing should be conducted by a responsible person capable of dealing with unexpected problems.

22. Do not scatter pieces of equipment, reels, or film cans in the work area.

23. Keep access aisles clear.

25. Keep main entry doors unlocked.

26. Keep room temperature comfortable.

27. Do not allow smoking in a crowded room.

28. Prevent hands or head shadows on the screen.

29. Handle the portable screen carefully since most moving parts are spring controlled.

30. Do not open a lamp housing cover while the lamp is on because

    a. the cooling air is lost;
    b. the light intensity may hurt the eyes;
    c. a person may accidently touch a hot lamp;
    d. a person may touch a fan;
    e. the lamp may shatter and spread broken glass.

PROGRAM PLANNING

Program planning is a relatively simple procedure that has a tendency to become complex. The procedure can be accomplished as early as a year in advance, or as late as a week in advance. Several good sources for program ideas are books about holidays or special events, calendars, or almanacs. Once the program's theme or purpose is established, then the outline should be laid out, as they are for other porgrams.

1. Select a program theme
2. Select a target group
3. Set a date
4. Select a site
5. Select the proper medium format
6. Select the appropriate material
7. Secure the material
8. Coordinate the public relations
9. Prepare a bibliography of selected materials the library owns which relate to the subject matter
10. Conduct the program

Later, evaluate the procedure and techniques used for possible improvement and modification. After the program planner has established a set of procedures which results in successfully produced programs, only minor changes will be necessary for adapting it to all other programs.

PROGRAM PLANNING

1. Select the program theme or purpose:

   a. Children's story hour
   b. Family entertainment
   c. Holidays selected from the Book of Holidays
   d. Seasonal events
   e. Sporting events
   f. Topics of current events
   g. Special interest groups
   h. Travelogue

2. Set the program's time limit:

   a. Children's films - ten to fifteen minutes
   b. Family entertainment - one to one and one-half hours
   c. Most film programs last from one to one and one-half hours. A guest speaker will set his own time limit.

3. Select the appropriate film for the program theme and time limit from a film supply source:

   a. In-house film collection
   b. System's collection
   c. Educator's Guide to Free Films
   d. Film rental sources

4. Have the selected film booking acknowledged in writing, if time permits.

5. Check the auditorium for reservations. Make sure it is large enough for the anticipated audience. If the initial response is greater than anticipated and seating will not be sufficient, schedule a second showing. Print and issue tickets for the second showing.

6. Check the availability of a projector. Should the need arise for a back-up projector, locate possible sources early:

   a. Other municipal agencies
   b. Religious groups
   c. Schools

7. Plan public relations program to reach the selected target group. Begin as early as a month, but no later than a week, in advance. Employ such tools as

   a. Posters in library lobby
   b. Notices on public bulletin boards
   c. Locate persons interested in the subject from circulation cards in subject-related books.
   d. Articles in newspapers
   e. Radio and television spots
   f. Graphic handouts
   g. Posters in stores and shopping centers
   h. Book markers

8. Create a bibliography of related materials which are available in the library.

9. Perform the program.

10. Evaluate the techniques used to set up the program.